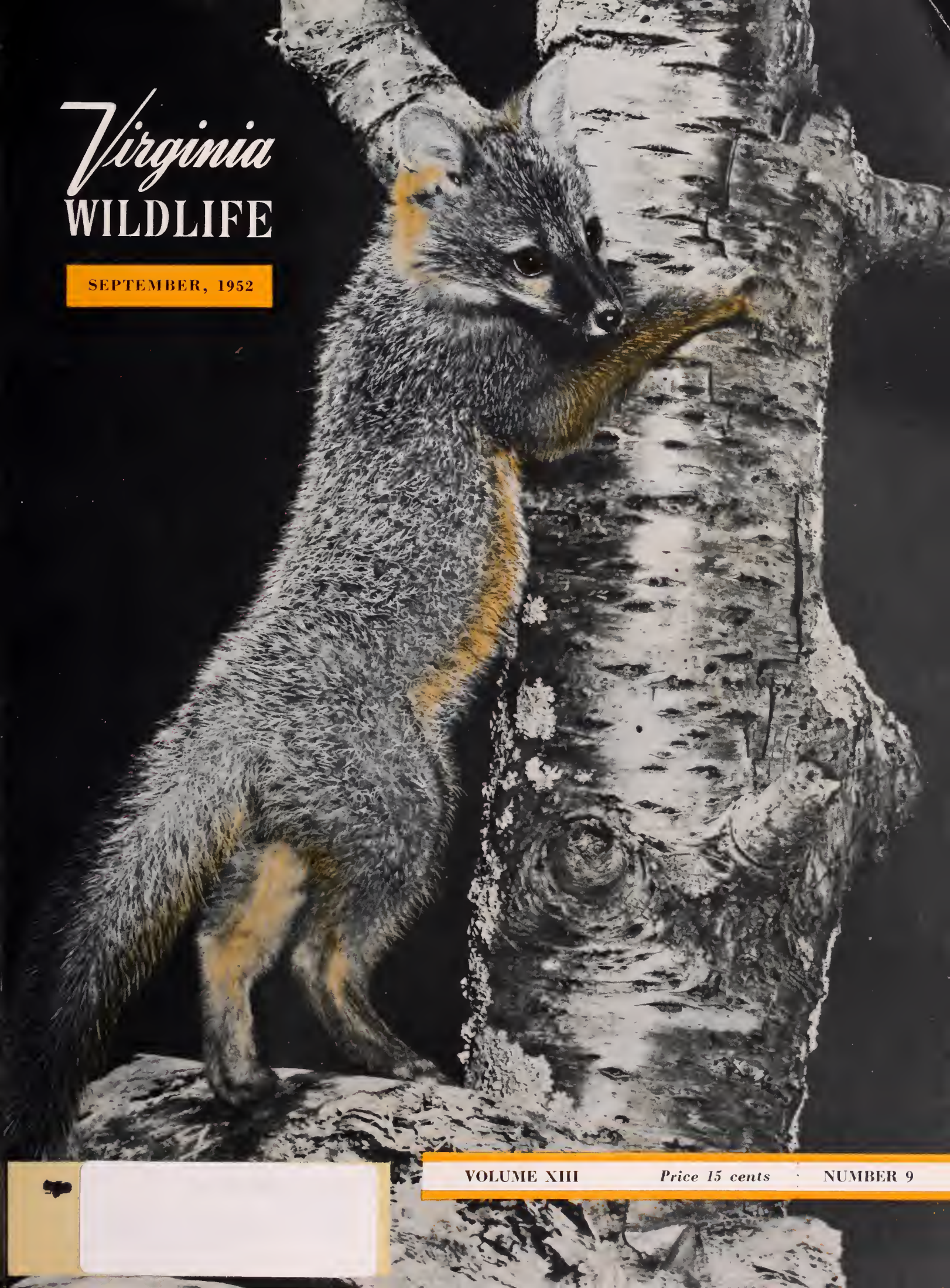
Virginia WILDLIFE

SEPTEMBER, 1952



VOLUME XIII *Price 15 cents* NUMBER 9

Commission photo

Behold, America!
Behold! thy fields and farms, thy far off woods and mountains,
as in procession coming,
Thy limitless crops,
Thy barns all filled,
The grapes that ripen on thy vines, the apples in thy orchards,
The inexhaustible iron in thy mines,
All thine, O sacred Union!
City and State, North, South, item and aggregate,
We dedicate, dread Mother, all to thee!
Our farms, inventions, crops, we own in thee! Cities and
States in thee!
Our freedom all in thee! Our very lives in thee!

—Lines from Walt Whitman

Virginia WILDLIFE

Published by VIRGINIA COMMISSION OF GAME AND INLAND FISHERIES, Richmond 13, Virginia

A Monthly Magazine Dedicated to the Conservation, Restoration, and Wise Use of Virginia's Wildlife and Related Natural Resources, and to the Betterment of Hunting and Fishing in Virginia

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Cover

A young gray fox (Urocyon cinereoargenteus) shows his climbing dexterity on this small cherry tree. Grays frequently climb low trees

Commission photo by Kesteloo

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STREAM POLLUTION

The wastes of our civilization threaten one of its vital resources: pure water. The solution to the problem is the fuller utilization of modern methods of waste treatment

By ROLF ELIASSEN
Professor of Sanitary Engineering
Massachusetts Institute of Technology

POLLUTION of the surface waters of the U. S. threatens one of the nation's most valuable natural resources. It menaces not only the water supplies of many of our cities, which consume over 15 billion gallons of water per day, but also recreational fishing, boating and bathing, commercial fishing, agricultural irrigation and even the very industries that produce much of the pollution. It must be remembered that the industries themselves require billions of gallons of water daily for processing and cooling purposes, and the pollution of river water may destroy its usefulness to them. Each river is a natural resource which one must expect to use and re-use from source to mouth.

The social and economic costs of pollution are beyond computation; they include such diverse items as effects on the health of our people, the expense of water purification, limitation of industrial expansion, loss of revenue to fishermen and recreational interests, decline of real-estate values.

There are approximately 20,000 significant sources of stream pollution in the nation: about 10,000 of them are municipal sewage systems and the other 10,000 are industrial plants. A single river such as the Delaware is estimated to receive each day 500 million gallons of domestic sewage and hundreds of millions of gallons of industrial wastes. The industrial needs for water are staggering: according to a recent survey by the National Association of Manufacturers, the manufacture of viscose rayon requires an average of 180,000 to 200,000 gallons of water for each ton of product: rayon yarns, 250,000 to 404,000 gallons per ton; woolens and worsteds, 140,000 gallons per ton; rolled steel, 110,000 gallons per ton; whiskey, 80,000 gallons of water per 1,000 gallons of whiskey; synthetic gasoline, 15,800,000 gallons per 1,000 barrels, and aviation gasoline, 1,050,000 gallons per 1,000 barrels.

There are three categories of pollution—chemical, physical and biological. The chemical pollutants include such toxic substances as cyanides, acids, chromates, copper, zinc, arsenic and mercury, which kill fish and other life and render water unfit to drink. Among them also are organic chemicals which, though not toxic themselves, serve as food for bacteria. The physical agents of pollution are often overlooked, but they, too, are important. For example, heat, which not many people would consider a form of pollution, has become a major problem; after being used and re-used many times by industries for cooling purposes, the water of a stream sometimes is raised as much as 50 degrees above its natural temperature, and it loses its cooling value. Another physical contaminant, which will give increasing trouble, is radioactive waste. In addition there are physical agents, such as clay particles, that make waters colored or turbid. The third type of contaminant—biological—of course is familiar to everyone; responsible for typhoid fever, dysentery, gastroenteritis and a host of other diseases, it has been the concern of health authorities for centuries.

Before discussing methods of reducing stream pollution, it would be well to consider the characteristics of streams and their ability to absorb pollution. Water is not dead—it is alive with flora and fauna, with energy and movement, with all sorts of matter. One of its most important assets is its content of dissolved oxygen. If the oxygen content falls to less than four parts per million, the water becomes unsuitable for game fish. When it drops to zero, as has happened in a good many streams in this country, the stream becomes septic, generates foul odors and is a serious nuisance to the nearby population. But most important is the fact that oxygen helps give a stream the power to purify itself.

Organisms in a stream use the dissolved oxygen in their metabolic processes as they consume organic matter. Their oxidation of this material, plus coagulation and settling, reduces the concentration of polluting organic matter in the stream. By this self-purification a stream into which a city pours its wastes may regain its original purity many miles downstream from the source of the pollution.

Reprinted by special permission from the *Scientific American*, March, 1952.

There is a limit, however, to this capacity. The stream loses its ability to absorb organic pollution and purify itself if its microorganisms use up the dissolved oxygen faster than it can be replenished from the atmosphere. The rate at which the microbe population uses up oxygen depends primarily on the amount of organic matter in the water. This establishes what is known as the biochemical oxygen demand (B. O. D.) of the stream. In the unending struggle of a river for self-purification, the B. O. D. must never be allowed to get out of hand and reduce the oxygen balance below a certain level. This minimum is generally considered to be four parts of oxygen per million parts of water.

The problem, then, is to reduce the amount of organic matter to the stream's capacity to absorb it, and to get rid of toxic materials. Sanitary engineers and scientists have developed many ways to do this. One of them is the settling tank, where sewage and industrial waste is held for a short time (usually about two hours) until enough of the solid material settles to the bottom so the liquids can be discharged into the stream. On the average settling will remove about 55 per cent of the suspended solids and 35 per cent of the organic matter that would exert oxygen demand in the stream. By chemical treatment still more of the pollutants can be precipitated. Iron or aluminum salts, particularly sulfates and chlorides, are added to the liquid, and by reaction with the water they form particles which serve as nuclei to adsorb and coagulate colloidal and suspended material. This method is widely used to precipitate inorganic and organic matter in industrial wastes, particularly toxic substances such as come from metal-finishing plants using chrome-plating processes.

There are a great many other treatments, but we shall consider in detail only a few of the important biochemical ones. Essentially these are based on the same natural processes by which a stream purifies itself; that is, they use microorganisms to break down the organic matter.

One device is the trickling filter. This consists of a large bed of crushed rock or gravel, from 10 to 200 feet in diameter and 3 to 8 feet deep, with microorganisms growing in the bed so they cover the stones with a coat of slime. The population of organisms in this slime is very complex, and the myriads of different kinds of bacteria and multicelled animals, acting together, can break down many varieties of organic material—cellulose, fats, greases, proteins, and so on.

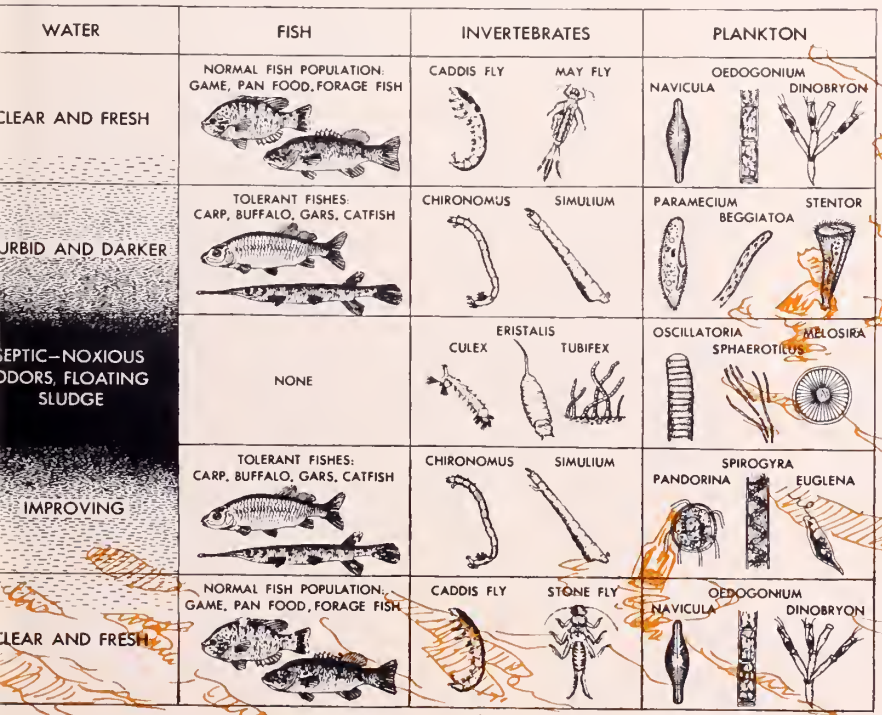
The sewage to be treated is trickled through the rock bed, and the bacterial slime goes to work on its solids. With the aid of their enzymes the bacteria consume soluble organic matter directly as food. Material that is in colloidal form may be adsorbed on the surface of the slime; it is then ingested directly by protozoa or may be hydrolyzed and become soluble food for bacteria. If necessary, the sewage or waste is recirculated through the bed several times—as much as 30 times in the case of some industrial wastes. The trickling filter can remove from 60 to 95 per cent of organic matter from liquid wastes. It has proved to be the answer to many of the pollution problems of industries and of small and moderate-sized cities.

Some of the largest cities have resorted to a more economical method, called the activated sludge process. Activated sludge is a mass of gelatinous material consisting of fuzzy particles about one millimeter in diameter. It is generated from microorganisms that occur naturally in sewage, and it is built up by letting the organisms "brew" for several months until they attain the proper balance of population. Once the sludge is formed, it purifies sewage in much the same way as the trickling filter, except that the operation takes place in a large tank instead of a bed of rock. Fine air bubbles are blown through the liquid in the tank to furnish dissolved oxygen for the organisms as they work on the sewage. The mixture then flows to settling tanks where the sludge, carrying the converted organic matter, is deposited. This process removes 90 to 95 per cent of the organic matter from sewage and usually yields clear water as the effluent. The sludge, after settling, can be used again.

After the organic matter has been removed—by the trickling filter, by activated sludge or by some other process—the water often needs to be treated further to kill disease-producing bacteria before it is discharged to the stream. The most commonly used disinfectant is chlorine. By adding from 5 to 15 parts of chlorine per million to the effluent and keeping the liquid in a tank for about 15 minutes, it is possible to destroy more than 99 per cent of the bacteria.

The sludge removed from the sewage also must be treated. Much of its material is putrescible, and is about 100 times more concentrated in the sludge than in sewage.

Pollution and recovery of a stream are reflected in an intricate physical, chemical and biological system. As the oxygen dissolved in the water decreases (current at left) so do certain microorganisms and, in turn, the invertebrates and fishes that depend upon them for food



The most common method of handling sludge is anaerobic fermentation, that is, breakdown of the material in the absence of dissolved oxygen. This is done in large "digestion" tanks. In these tanks, where the sludge is kept anywhere from 2 to 100 days, bacteria and other microorganisms decompose most of the putrescible organic matter into simpler compounds of carbon, oxygen, hydrogen, nitrogen, sulfur and phosphorus. Some of the end products are discharged as gases, mainly methane, carbon dioxide and hydrogen sulfide. The gas mixture, about 65 per cent methane, has a heating value of 600 British termal units per cubic foot (better than manufactured cooking gas). It can be used to heat the digestion tanks and furnish power for pumping and other equipment in the disposal plant. The solid residue from the digestion of sludge is a humuslike material which makes a good fertilizer; if may contain from one to five per cent nitrogen and some phosphorus and potash. Some large activated sludge plants dry the sludge without digesting it first, and sell the dried sludge as a fertilizer base. Dried sludge from the sewage plants of Milwaukee is marketed and known throughout the country as Milorganite.

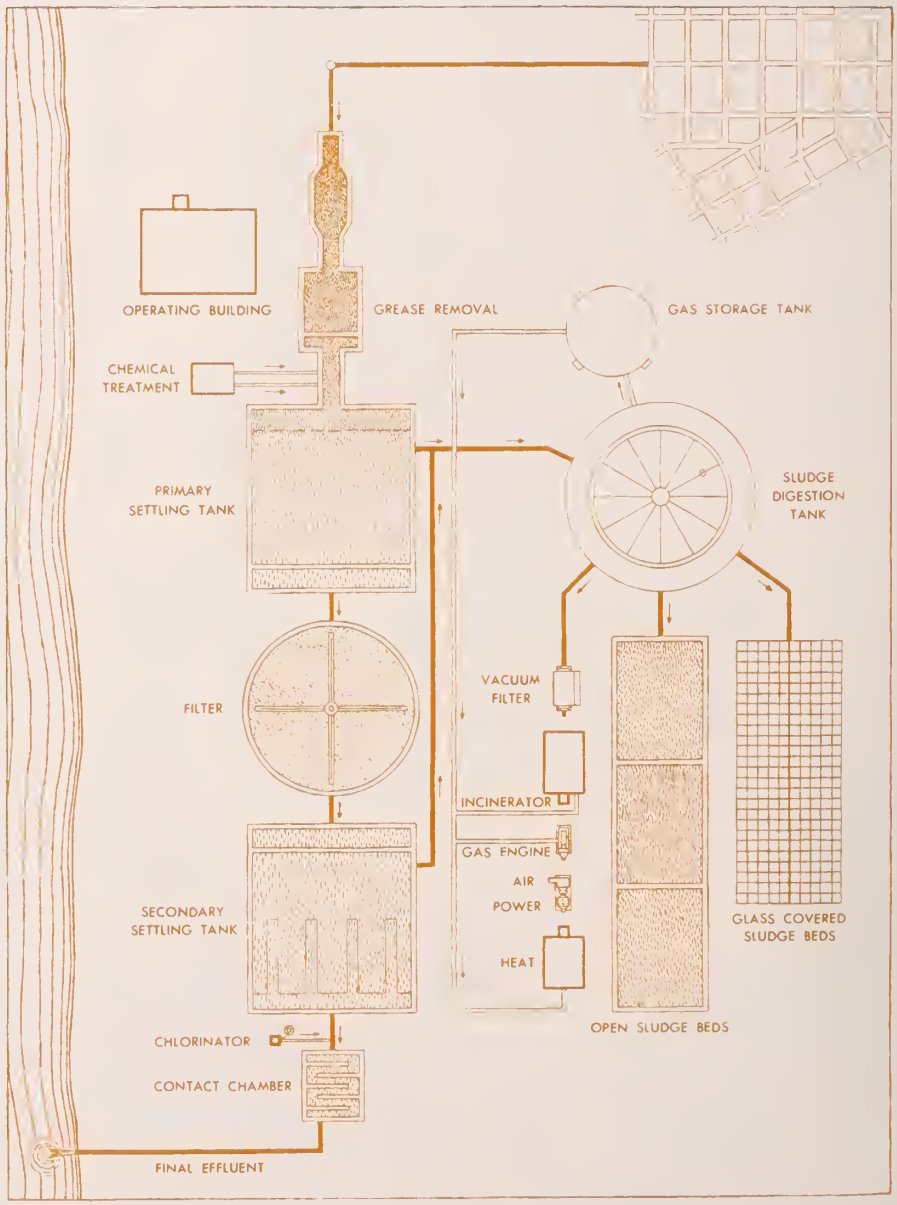
New York City, Chicago, Los Angeles, Philadelphia, Cleveland and London all have large activated sludge plants; Chicago's, the largest, treats an average of 1.1 billion gallons of sewage per day. Not all make use of the sludge products; for example, New York City dumps its liquid sludge into the Atlantic Ocean, because this is more economical at present than processing the sludge into organic fertilizers. The need for such fertilizers is great, however, and someday New York's sludge will be used.

It will cost substantial amounts of money, of course, to make the streams and other waters of the U. S. reasonably free of pollution. The construction costs of municipal sewage treatment plants such as have been described in this article run from $10 to $50 per person served by the sewerage system. Added to this are operating costs, which range from $10 to $40 per million gallons of sewage treated.

Los Angeles has just spent $42 million for a treatment plant to protect the Santa Monica bathing beaches; New York City is spending $200 million for treatment plants; Pittsburgh and neighboring towns in Allegheny County will spend about $80 million; Miami is completing a $10 million project. Since 1915 municipalities in this country have spent about $10 billion for sewers and sewage-treatment plants, and it is estimated that they will have to spend another $10 billion in the next 20 years to build enough plants to handle their sewage.

In addition, U. S. industries will probably have to spend about $10 billion more to change processes and build plants to dispose of their wastes. Management realizes that public opinion is gradually forcing industry to shoulder its part of the burden of alleviating stream pollution, and that waste treatment must be considered an integral part of invested capital and production costs. Operating, maintenance and financing costs for these plants will eventually amount to a quarter of a billion dollars yearly, the cost of which can only be passed on to the consumers of the industries' products. If the public wants stream-pollution control, it must be willing to pay in terms of increased taxes and increased costs of consumer goods.

To control pollution intelligently we need standards for



MODEL SEWAGE PLANT employs sedimentation, filtration and digestion. In the latter process sludge is attacked by anaerobic bacteria. The gas evolved by the bacteria is utilized to provide heat and power for the plant. The remaining sludge is then dried either in a vacuum filter, open sludge beds or glass-covered beds

View of a model sewage treatment plant near Richmond

the discharge of wastes and the degree of purity we want in our streams. The standards of course will depend on the priorities to be given the various possible uses of the available water—domestic and industrial water supply, bathing and other recreation, fishing, the transport of wastes. To develop water standards for each of these uses and for regulating them, we shall need surveys. Very little has yet been accomplished in this direction, nor have many states passed enabling legislation for pollution control.

Every state has an agency in which this function may be vested, whether it is the Department of Public Health, as in Massachusetts, or a specific Water Pollution Board, as in California. Primarily stream pollution is a state problem. But where a stream runs through more than one state, regional authorities are needed, and several have already been formed, including the Ohio River Valley Water Sanitation Commission, the Interstate Commission on the Delaware Basin, the New England Interstate Water Pollution Control Commission and agencies for the drainage basins of the Hudson and Potomac Rivers. The states have also found that they need the co-operation of the Federal Government. The Taft-Barkley Act of 1948 authorized the U. S. Public Health Service to assist the states in developing pollution-control programs.

The Public Health Service, with the aid of states, regional agencies and industries, has collected and analyzed some data on the needs for waste-treatment facilities in the major drainage basins in the country. These studies have helped citizens to realize that their pollution problems may originate far upstream, even in another state. Industry is co-operating extensively in these surveys, particularly through the National Task Committee on Industrial Wastes sponsored by 22 of the nation's leading industries and the Public Health Service.

There are still many unsolved problems in the treatment of wastes. It should be possible to develop more economical processes than those now used. Moreover, for some of the organic pollutants no effective treatment has yet been found. The hope for solution of these problems lies in further research.

Microbiologists and sanitary chemists have made great strides in the treatment of toxic wastes such as phenol and formaldehyde. Studies are currently in progress in the Sedgwick Laboratories of Sanitary Science at the Massachusetts Institute of Technology on the fermentation of a number of concentrated organic wastes from the chemical, paper and cotton textile industries. Experiments are being conducted on the effectiveness of various microorganisms, combinations of nutrients, temperatures and degrees of acidity. These studies are making available new processes which can handle a greater variety of organic industrial wastes.

Radioactive wastes have created a serious problem for the sanitary engineer. With the growth of the nuclear industry in such fields as atomic power and tracer research, to say nothing of nuclear weapons, stream-pollution control is becoming a matter of primary concern. The processing of radioactive wastes is being studied intensively in many laboratories.

Under the sponsorship of the Atomic Energy Commission the author and his colleagues have been investigating the removal of low concentrations of radioisotopes from liquid wastes by chemical coagulation, sedimentation and filtration. Evaporation is effective in separating radioactive material from liquids, but it is too expensive. The M. I. T. studies have disclosed that coagulation is a good and economical method of removing radioactive substances when they are in colloidal form or suspended as solids. Dissolved substances present a more complex problem, but it has been partly solved; certain special coagulants that precipitate ions can remove more than 90 per cent of the radioactive material. Research is also in progress on the possible toxic effects of beta and gamma radiation from substances such as radiophosphorus and radioiodine wastes on microorganisms that help a stream to purify itself.

We can clean up our streams to almost any degree we like by spending enough money. To restore our heavily populated rivers to their pristine purity would be much too costly, but sound engineering and the expenditure of about $20 billion by municipalities and industries could reduce the pollution of the streams of the U. S. to a reasonable level.

Smallmouths from the Big James

Commission photos by Kesteloo

IF IT'S smallmouths you're after—big ones—Virginia's fabulous James River above Richmond is hard to beat. But there's a catch to it. The lunker bronzebacks are hard to get to, the waters treacherous, and an air of unpredictability surrounds the fishing. But this is what makes the going interesting, if not challenging.

"Want to break a leg?" asked my friend one day over the phone, "almost, that is, and get to some big smallmouths? Long as your arm and scrappy as a wildcat in a bathtub. Call me back some day and we'll go."

And call him I did one seething hot summer day with city temperature pushing 107°, and rising still higher.

"Chuck," I called over the phone, "I'm burning up. Let's make a try for those river smallmouths. The water should be right. It looked low all week. You know we haven't had any rain in weeks."

Two hours later we were down on the rocks on the James, just a good train whistle above Richmond, north of the Boulevard bridge.

"This place," boasted Chuck, "is out of this world for smallmouths. Best in the east. I've been coming here for years and I know what I'm talking about. This river bottom has a mystery all its own and harbours fish you can't handle. Just you wait and see what I tell you."

I had always heard about the James ever since coming to Richmond some five years ago, and while I had fished it at times in several places with only mediocre luck, I was determined to give it a real try someday if I found a man who knew the river. Now my time came. Chuck was my hope. He was an Army colonel, bone hard from several years of military service, and as rabid on smallmouths as a genuine fisherman ever could get.

"I'd rather come down here and relax on a hot day than anything I know of," he rejoiced. "Feel this cool air? Look at that water. Man, if people only knew what's in the river."

We unraveled a small minnow seine and started after some live bait. Minnows were all over the rocky shoreline and we scooped up a hundred in a single sweep.

"They make good bait, these longer ones," said Chuck, "but it's these dobson and crayfish here that make the killings."

"I'll use artificials, if you don't mind," I said. "Not that I'm a purist but it's just the way I like to fish best."

Chuck wasn't the arguing kind on a fishing trip. He was always a good sport and used whatever he thought the fish were taking. And he was just as good with a minnow or a hellgrammite as he was with a gray ghost streamer.

"Now for the acrobatics," he said, looking across the river. "See those rocks in the middle? That's where we want to go. The big ones hug the boulders deep near the bottom—waiting for food. The secret is knowing how to get to those dangerous holes without being swept downstream. Just think you're a billygoat and an Esther Williams combined and you'll be o. k."

The next 20 minutes witnessed some expert foot work and swimming tactics in the river. Stripped to only our swim suits, we waded and jumped and climbed our way half-way across the treacherous shoals and rapids. Exhausted and panting like a couple of Walkers on a fox chase, we finally reached a large rough ledge with wild water sweeping around both sides and crashing down into a deep hole below.

"Hell's cauldron," puffed Chuck. "There's a dozen more like this downstream. This one's about the best. But one false move and you're a goner. So be careful."

We tried the hole for ten minutes. Chuck used a casting rod and a deep-running minnow. I flipped around a weighted streamer. Nothing happened.

"What about those other holes," I said finally, thinking

Top: Seining for fresh water minnows below Williams Dam on the James. Note boulders and low water conditions

Center: A Richmond girl, Nellie Goddin, scoops at a smallmouth while her companion, Alex Mason, looks on

Circle: A nice catch of smallmouths. The James above Richmond yields some fabulous bass each summer

we should part company and try our luck separately. Chuck agreed. As we started bringing in our lines, a flash of green hit my lure and I was fast to a struggling smallmouth. He was a fair fish, about two pounds, and gave a good account of himself before Chuck gave an assist in getting him out of the water.

We stayed apart for a while but within speaking distance, trying this hole, then that. The morning yielded four bass and a ten-pound channel cat. Chuck snagged two of the smallmouths and I picked up another, plus the cat. They all ran about the same size. Nothing real big but lots of fun.

Late in the afternoon we rested atop a giant boulder, about a mile downstream from where we had started, waiting for the late shadows to drop.

"They might feed better in an hour or so," I said hopefully, "but I don't like those clouds."

Above, at famous Williams Dam to the west, people saw the ominous warning. When the first roll of thunder came, they began scurrying off the dam like ants off a hot stick.

"Just an approaching shower," Chuck commented casually. "We're o. k. out here. We can take to the island if need be. Fishing is always good after a rain."

Well, the next hour was an experience I'll never forget. Not only did we get a thorough drenching, but we lost our five fish in the process, and very nearly got marooned on the island. Rain and thunder came for a solid hour. The river turned a dirty green and yellow, and rose quickly. In just a few minutes it rose two feet and got alarmingly swift.

"Man, this is getting bad, Chuck!" I called, "we'd better try for shore. If darkness comes, we'll never make it."

Chuck looked worried for the first time. Then to ease his mind a little, he let out: "Just let me try this one more hole and then we'll go. I believe we can swim it. She's only up a couple of feet." Quickly he made a long cast.

That was it. On the first drag a smashing fish hit his big minnow. His rod bent double instantly as a heavy bronzeback put the weight on his line and began a sprint past him going upstream with the power of a C. & O. locomotive.

"Great Day in the Morning!" I yelled. "You've got a monster! Hold him!"

Chuck was all business. He played that gladiator for the next 30 minutes in a fight such as I have yet to see duplicated in fresh water. Time and time again the fish surged into the rising current, only to sink deep again and bulldog near the bottom. Finally after making a

(*Continued on page 23*)

THE MANAGEMENT OF VIRGINIA'S SEAFOOD RESOURCES[1]

By J. L. McHUGH

Lawmakers, enforcement officers, and scientists co-operate to maintain an important industry

(Commission photos by Kesteloo)

ACCORDING TO figures collected and published by the U. S. Fish and Wildlife Service, the annual seafood landings in Virginia since 1880 have averaged about 254,000,000 pounds. In recent years this catch has brought an annual income to the fishermen of close to $20,000,000. Among the 48 states, Virginia is the third largest producer in weight of seafoods, and the fifth largest in terms of the landed value of the catch.

What Factors Affect the Supply of Seafoods?

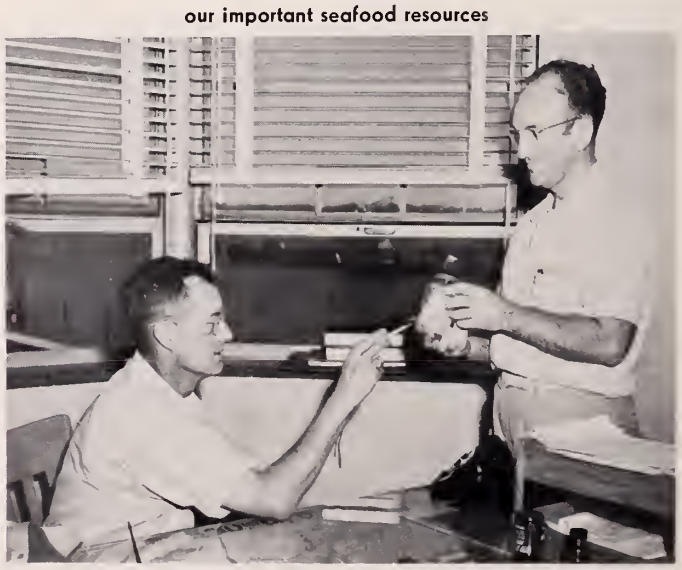
Fishery resources can be exploited indefinitely under certain conditions without endangering the future supply. This supply is maintained by the spawning of adults, and by the survival and growth of their progeny. Many factors operate to alter the numbers of individuals and their rate of growth: eggs, young, and adults are destroyed by many other marine animals; parasites and diseases take their toll; competition for food causes many to weaken and perish; extremes of temperature and other physical and chemical conditions in the water influence survival and growth in many ways. But in spite of these destructive forces, the vast reproductive potential of most aquatic animals guards them against extinction. A single oyster or blue crab produces many millions of eggs, a shad or a croaker several hundred thousand. If all the requirements necessary for life were available, most of these should have a good chance to survive. However, most of the young that these eggs produce are doomed. If all survived, the problem would be the elimination of excess. This principle has been demonstrated clearly in certain lakes, where excessive numbers of fish lead to poor fishing.

Man's activities add to the perils that beset aquatic life: the dams that block many of our rivers prevent fish from reaching their former spawning grounds; industrial and domestic pollution deny other stretches of water to adults and produce conditions that are detrimental to developing eggs and young; careless forestry practices and bad land management affect runoff in the streams, block migration routes, and carry additional silt into the waters; thoughtless fishing methods may reduce the supply of spawners or the stocks of young to dangerously low levels.

The intervention of man in this system is usually looked upon as an additional source of mortality that tends to disturb the delicate balance achieved by nature. It is not certain, however, that man should consider himself as different from the other enemies that prey on marine life. By fishing, he may be utilizing food that otherwise would be lost from some other cause. The great herring fisheries of the North Sea have been exploited heavily for several hundred years, yet have suffered no apparent harm. It has been shown for several important fisheries that when the numbers of individuals are reduced, the rates of growth and survival of the remainder increase.

Nevertheless, it must be recognized that the number of human predators is increasing rapidly, and that their efficiency in capturing marine organisms is increasing at an even greater rate. It also may be true that man can eliminate completely certain of the more vulnerable

The modern Virginia Fisheries Laboratory at Gloucester Point on the York River is designed to carry on research investigations relating to our important seafood resources

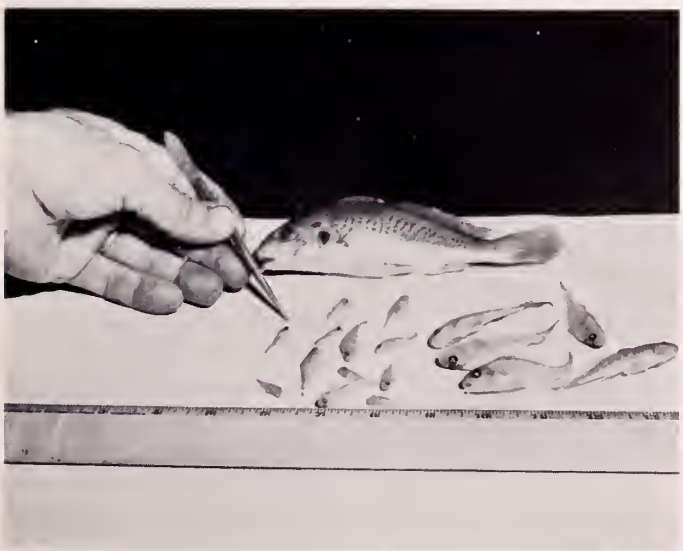


Laboratory director, Dr. J. L. McHugh (left) and educational assistant, Robert S. Bailey, discuss fish study project and means of getting management information over to the public

[1] Contributions from the Virginia Fisheries Laboratory, No. 38.

The *Virginia Lee*, a Laboratory research vessel, is used extensively in fisheries investigations

The Laboratory is gathering information toward an understanding of the fluctuations that characterize the commercial fisheries. The study of the important blue crab is only one of many activities



The dramatic decline of the croaker in the Chesapeake Bay area has spurred research on this important food fish

species. In general, this vulnerability increases as the animals are more intimately associated with shore. The shad, which congregates at spawning time in the restricted waters of coastal streams, might be destroyed completely by the simple expedient of blocking the rivers below the spawning areas. Similarly, the supply of spawning oysters might be removed entirely by intensive fishing. Perhaps complete annihilation would never occur as a result of fishing, because before the fishery reached this point it would become unprofitable to fish, and the fishermen would turn to other species or other occupations. But if a few operators continued to fish, this might constitute an effective barrier to recovery. The sturgeon seems to have suffered such a fate.

How is Virginia Attempting to Ensure the Future Prosperity of the Seafood Industry?

We should be concerned, therefore, over the future of our fisheries, and should be prepared to protect them against depletion. Fishery legislation has been enacted in Virginia since the seventeenth century, and for almost a hundred years the enforcement of these laws has been the responsibility of the Commission of Fisheries. The Commission consists of a chairman and four additional members, appointed by the Governor. Its permanent office, located in Newport News, is headquarters for the administrative and engineering staff, and inspectors. The Commission issues fishing licenses, surveys and records locations of oyster grounds, enforces fishing regulations, collects information on the condition of the industry, and plants shell in appropriate areas on the public oyster grounds. It maintains a fleet of fast, modern patrol vessels with permanent captains and crews, and a staff of inspectors and deputy inspectors.

An important responsibility of the Commissioner is the conduct of investigations relating to the migrations, habits, and propagation of fish and shellfish in the tidal waters of the state. To assist him in this function, the Legislature authorized in 1940 the establishment of the Virginia Fisheries Laboratory. Located at Gloucester Point, on the York River, the Laboratory is operated jointly by the Commission of Fisheries and the College of William and Mary, represented by a Board of Administration consisting of two representatives from each agency. Contact with the industry has been maintained through a nine-man Advisory Group.

In the past, many laws enacted for the protection of the fisheries have been based on opinions rather than facts. Unfortunately, this is still true to some extent. The incentive for many laws has been the fear that unrestricted fishing would lead to depletion, or the opinion that apparent scarcities had come about mainly through fishing operations.

The Virginia Fisheries Laboratory is gathering information gradually toward an understanding of the fluctuations that characterize the commercial fisheries. Although the total annual landings have remained relatively constant over a long period of time, the catches of many species within the Chesapeake Bay, notably croaker and shad, have exhibited dramatic declines, and the relatively

young and growing trawl fishery in the ocean outside the capes has served to maintain the level of production. Similarly, in recent years, the take of market oysters from the public grounds has decreased, and the supply has been maintained by increased private production.

What are Some of the Problems that Face the Industry?

Measures to halt the dwindling supply of shad have consisted of certain restrictions on fishing, and the artificial propagation of young in hatcheries. Recently the shad catches have been improving, and this spring the largest run in many years ascended the York River. This improvement has been credited by many to the hatchery program, but the available information lends little support to this belief. Credit might be given equally well to a happy combination of natural factors, at present unknown, that have favored the survival of fish from recent spawnings.

Oyster studies are moving ahead rapidly. The 1952 General Assembly passed a law requiring shuckers to hold 20 per cent of their shell for the Commission, and provided the Commission with additional funds for purchase and planting

The spectacular disappearance of the croaker has brought great hardship to many fishermen. Among the reasons that have been advanced to explain this disappearance perhaps the most serious criticism has been levelled at the North Carolina shrimp industry, which kills large numbers of young croakers in its trawls. A research program was inaugurated at the Laboratory in 1950 to study the status of the croaker stocks, and while it is yet too early to assess the results of this work, there is some reason to believe that the decline may have been caused by natural forces.

Of all the problems that plague the oyster industry in Virginia the management of the public rocks is perhaps the most difficult. Large numbers of oysters are removed from these grounds each year, and little or nothing has been returned in the form of cultch on which the newly-hatched young must strike. In 1928 the Commission of Fisheries commenced planting shell on the public grounds. In 1952 the General Assembly passed a law requiring the shuckers to hold 20 per cent of their shell for the Commission, and provided the Commission with additional funds for purchase and planting.

A further danger threatens the James River seed beds, the only public grounds from which it is permitted to take oysters less than three inches in length, in that the intense fishing may deplete the brood stock. In this event, the only possible source of oyster larvae for the maintenance of seed production will be the adults on private grounds. It is perhaps fortunate that ground is available for private leasing in the vicinity of the public rocks. The situation is even more acute in the Rappahannock River, where the production of market oysters on public grounds has declined, and the annual strike of spat is less dependable than in the James. The public grounds might be in much poorer condition if they were entirely self-sustaining.

The history of the blue crab fishery illustrates the magnitude of the fluctuations to which a marine population in the Chesapeake Bay may be subject. The available figures show that from 1880 to 1890 inclusive, less than 10,000,000 pounds were landed annually, but the catch increased rather regularly until 1915, when a total catch of over 50,000,000 pounds was recorded. Thereafter, the annual landings have fluctuated rather widely, reaching low points in 1920, 1934, and 1941, and high points in 1930, 1939, 1948, and the season just past. While it is almost useless to draw conclusions concerning abundance from records of the total catch, the reports of the Commission of Fisheries contain references to periods of scarcity and abundance, and indicate that in the periods when catches were small alarm was expressed over the future of the fishery. In recent years egg-bearing females have been protected within an extensive sanctuary near the mouth of the Chesapeake Bay. In the opinion of many, this sanctuary has been the chief factor in the gradual recovery of the fishery in the last decade. There is other evidence, however, that the success of reproduction may be dependent on the salinity of the water in the lower part of the Bay. If this is true, the sanctuary can hardly have much effect in maintaining production. In other words, there is no proof as yet that the abundance of crabs has been sustained by management.

It is encouraging that certain of our fisheries return periodically to former high levels of production. The ideal that is sought by all those connected with the industry: a maximum yield that can be attained without exception year after year, is hardly to be expected. Even in agriculture, where a greater degree of control is possible, this goal has not been reached. Fortunately, economic factors tend to stabilize the fishermen's income over poor years and good. This has been demonstrated very recently in both the crab and the shad fisheries; the continued high production of crabs in the winter dredge fishery of 1951-52, and the phenomenal runs of shad in the James and York Rivers in the spring of 1952 brought prices down to a very low level. In times of low availability, on the other hand, the continued demand supports the price; consequently, the value of the catch is apt to fluctuate less widely than the catch itself.

(Continued on page 23)

SEPTEMBER

Wildlife Pictorial Section

(Commission photos by Kesteloo)

Cecropia moth beside leaf-covered cocoon spun for wintering pupa

A young least bittern stares stick-like and motionless into the sky

A magnificent golden eagle bars his wings and surveys his southwestern Virginia kingdom

Black bear cubs at play. These little fellows were caught in a fisticuff just before being taken to the Roanoke zoo

Flying squirrel about to leap and sail to the next tree. Note skin folds along feet and abdomen which facilitate "flying"

Laughing gull on its nest on Virginia's fabulous Eastern Shore

My, but it's a tiresome world! This is Daphne, one-time pet opossum of photographer Kesteloo

Wildlife is a By-product of Good Farming

By
J. J. SHOMON

WHEN I was a country lad back in the early twenties we had so many rocks on our farm that I was sure they grew in the fields. Well, it didn't take me long to find out that this wasn't so and eventually, through growing wisdom and the help of an elder biologist friend, I learned that our whole place was a complex living community based on the soil. And while the rocks themselves didn't really grow, they formed a definite part of the living, breathing, seething life around us.

Science tells us that every farm, every woodland, every acre lot is a complicated community of living and non-living things. Wildlife lives, breeds, rests, dies on the land. We know now that if we want more wildlife around we must manipulate the land and arrange the community relationship so as to be favorable to wildlife.

Take farm crops, for instance. If the farmer wants more corn, what does he do? He plants more corn and tries to guard it against weeds and insects. If he wants more tobacco, he strives to get his acreage increased by the authorities, then puts out more young plants and gives the land special treatment favorable to tobacco. Correspondingly, if a landowner wants more quail or deer or squirrels he can have them on the land, and it will be better land for it. But it calls for special treatment.

We used to have different theories on how to increase wildlife, but one by one we've tossed them out the window. We used to think protection alone was the answer. It wasn't. Then we thought about a system of refuges. We thought this was all that was needed—but that also wasn't so. Then came the era of game farms and mass liberation of birds. But this practice too proved full of illusions.

We know now that hand-fed wildlife soon loses its wildness, loses its know-how in the fields, weakens, disappears or dies because of lack of proper adjustment in nature. So now we've come to the root of the problem. We've begun using the best tool of management known to science, that of letting nature do the job with man helping out in habitat improvement.

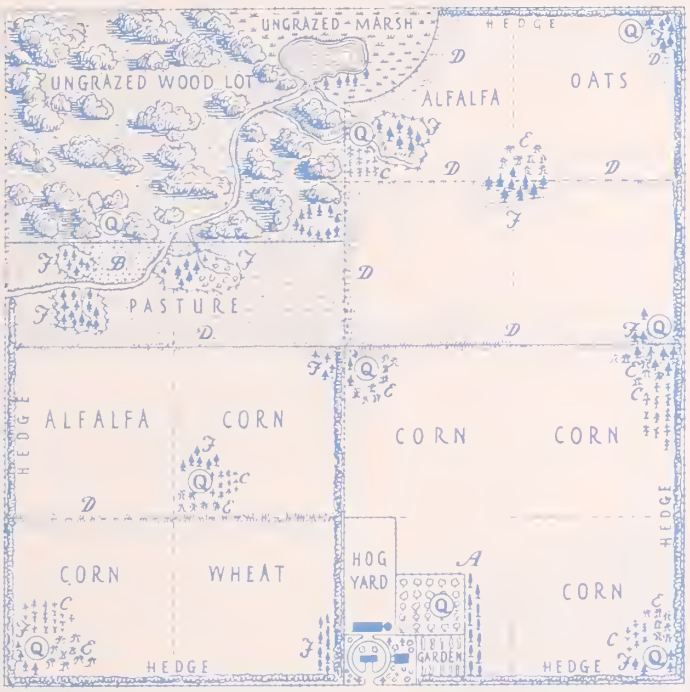
This new theory is based on the premise that more food and cover and protection are essential if wildlife is to make a comeback. It appears to be our best hope. If these three basic requirements of wildlife are not the answer, then we don't know what the answer is.

It has been only in recent years that farmers have started to operate their lands according to definite plan. Today, through the Soil Conservation District program it is almost rare to find a good farm that doesn't function under some kind of a farm management plan.

In planning for a long-term farm operation, emphasis is placed on money-making for the farmer. Each parcel of land is put to its best use. Land that is sub-marginal or poor is turned into some good use, like wildlife areas or timber or watershed protection.

A farm carefully planned for full production can just as effectively include wildlife as not. Instead of a "no plan" for our furred and feathered friends, definite projects can be adopted which will help animal life. Creek or

Sketch of a 160-acre farm before adoption of a farm plan. Note little cover left for wildlife; only one quail covey (Q) here. Could produce 8 to 10 coveys, plus rabbits, squirrels, marsh wildlife and many songbirds



Map of same farm as on previous page but after farm planning and improvements for wildlife. Note fence lines, ungrazed pasture and marsh, new pond, and numerous quail coveys marked by Q. Other improvements are A, windbreak; B, soybean patch; C, standing unshucked corn; D, hay strip left standing; E, corn in stacks; F, cover patch of sumac, pine, cedar, honeysuckle, etc.

stream edges can be put to shrubs and grasses; corners in fields can be left in standing grain: fence rows can remain unburned or ungrazed or left to grow over instead of cultivated clean.

A well-built farm pond can be a big asset to any parcel of land. Besides drinking water for livestock it can supply muskrats and fish. This is added income to farm youngsters who wish to trap in the winter. And think of the fishing fun that one can have all year around.

On every farm there are small areas which can be put to work growing more wildlife: bald spots, low areas, washes, pot holes, pits, eroded sections, springs, marshes, river banks. These only need a measure of attention to make them productive.

A farm planned for wildlife is a better farm. There's more game to hunt for the farmer and his friends, there's better biological balance, there's higher all-round production. The farm is more valuable.

There is no magic formula on how to increase game. Landowners, farmers, sportsmen—everyone who wants to see more wildlife about—should ever keep in mind that *it is what is done with the land that is most important.* Wildlife is only a by-product of the fields and streams and woods. If we want more of it around, we must give it what it needs to survive.

Landowners hold it in their power to increase wildlife everywhere and in doing so they can aid themselves. Most farmers will find that the mere companionship of added wildlife is sufficient justification for wildlife planning. But there are economic and esthetic values involved which are hard to measure, and the deliberate encouragement of bird and animal life on the farm is good sound agricultural practice.

Wildlife management is no involved complex recipe for game abundance. On the farm it simply consists of doing a good job of farming. According to modern ways, a land-use plan will guarantee the full use by every acre of the most valuable crop to which it is fitted. In fact, land planners will not be satisfied unless each acre, in the course of usage, is built up in productive power and increased in value. This is merely good conservation—the development of our capital stock—good economics.

Today a well-planned farm is likely to yield many different crops. From each land unit—pastures, hills, "waste" areas—something profitable is gleaned. On well-tended level fields short rotations can be used with a high cash income. The poorer sites can have longer rotations with more grasses and of course less income. Grasses and legumes should be planted on hilly areas which wash badly under tillage. Trees or clumps of wildlife cover may be the only suitable planting for the extremely rough sections of the farm, and for the "waste" areas. Each parcel of land should be made to pay a dividend.

In the accompanying two sketches we have tried to picture the "before" and "after" conditions of a typical Virginia farm. Note how the emphasis has been placed on planning and how the rearranged fields and sub-marginal areas have been put to better use. Please note further how crop borders have been left to hedges and additional cover. This is all-important in wildlife conservation because game not only requires food and protection, but such things as lines of communication, rest areas, breeding places. In good farm management all these things are provided for wildlife.

It is unlikely that all of the measures can apply to a single farm. But some of them will, and each improvement should help. It is fundamental for every purpose to build fertility—to make the land more productive.

No group of people enjoys contact with living things more than do farmers, nor is there any group in our society from whom an appeal for wildlife help will receive heartier response.

Mr. Landowner, is your farm under planned management for good conservation practice? If it is, then you are doing right by yourself, your neighbor, your Creator.

If not, then you should investigate the possibilities of better farm planning. It will help you out in more ways than one. Of that you can be sure.

NEW USFS CHIEF APPOINTED

After nearly 40 years of public service, the last nine of which have been as Forest Service Chief, Lyle F. Watts has turned over the reins of USFS chief to Richard E. McArdle.

McArdle assumed top command on July 1, after more than 25 years with the Forest Service.

Watts began his forestry career as fire guard in a western national forest and served in four of the ten national forest regions.

FUN ON A BIRD WALK

By THOMASIA SPENCER

OUTDOOR enthusiasts who delight in observing bird-life will find the organized bird walk an enjoyable and refreshing experience. I should like to describe one of these excursions into birdland and show how group study can turn into lots of fun.

The Virginia Society of Ornithology met at Skyland in the Shenandoah National Park, on the Skyline Drive, one Saturday late in May, at seven o'clock in the morning. Between 60 and 70 members, out of a total membership of 350, came to the meeting.

We were offered a choice of three bird walks: one along the White Oak Trail, under the leadership of Paul Favour, park naturalist, one to Hawksbill Mountain, led by Dr. Alexander Wetmore, of the Smithsonian Institution, Washington, D. C., and one to the Big Meadows area, led by Charles E. Stevens, Jr., of Charlottesville. There were about 20 in each party.

My husband and I and our 11-year-old son Hugh, Jr., joined Mr. Favour's group along the White Oak Trail. We were introduced by Mrs. Hewson Michie, our fellow townswoman, and our son found another boy to team up with. This was Bruce McCartney, considerably older than Hugh, but a very obliging chap. Our companions were most agreeable, and their enthusiasm was contagious.

The weather was cloudy, chilly, and somewhat windy. One shivering soul called out, "Paul, I thought you said it was going to get warmer?"

Our attention was soon focused on the object of our trip when someone cried out, "Look! There's a blackburnian!" Binoculars were immediately turned into the trees, now in full leaf and in their first freshness, for the elevation here is over 3,000 feet.

The blackburnian was visible for only a second and then it disappeared. I learned, upon inquiring of Mr. Favour, that this bird is a species of warbler.

The party went along chatting gaily, instead of stealing furtively through the woods, as I had thought they might. The birds didn't seem to mind our presence. Often, some of the men went down into the brush to try and flush some bird up in our direction so that we could all get a glimpse of it. But the birds were usually hard to spot. Among those birds which we saw were the black and white, and chestnut-sided warblers, the pileated, and the hairy woodpeckers, a phoebe, and an Acadian fly-catcher.

"There's a veery!" someone called.

"Wood pewee!" another exclaimed, darting into the brush. A lady behind me said: "Wouldn't you like to use these glasses? I can't see these little warblers up in the leaves. Down on the coast where I live we have flocks of *big* birds!"

Happy to discover another amateur among all the experts, I accepted the loan of the glasses, feeling that the day would be a great success if I could get a close glimpse of only one bird!

Someone accidentally flushed a towhee from her nest on the ground. Carefully, Mr. Favour held back the surrounding growth so all could see. It was a perfect camouflage. In a tree we saw a thrush's nest. Hugh, Jr., delighted to have a part in this expedition, climbed a neighboring tree and told us there were three eggs in the nest.

Mr. James W. Eike, of East Falls Church, Virginia, president of the Society last year, told us about the fine recordings of bird songs. "Allen's bird songs are perfect examples of the true calls, interspersed with careful explanations," he said.

As we walked along, Mr. Favour and others pointed out unusual plants and wildflowers. This was wonderful. Those of us who had trouble seeing the birds now could study the flowers. We examined the beefsteak plant, golden alexander, louse-wort. Of the last Mr. Favour said, "Sheep raisers used to think that this plant gave lice to their flocks. That's how it got its name."

Another plant expert, Miss Lena Artz of Warwick, Virginia, explained certain edible plants and told us how to cook them. Even Mr. Favour asked her opinion when a question arose about some unusual plant.

Raymond Stevens of Arlington, who is a park superintendent in the Washington area, told us that jewel weed has been used as an effective antidote for poison ivy in day camps around Washington. Jewel weed and poison ivy often grow together in wooded areas.

Azaleas were in bloom everywhere. Their fragrance has a spiciness not unlike carnations or pinks. Lady slippers were a lovely sight. We came upon a jack-in-the-pulpit fully two feet high. Lying on the ground to get the best view of it, our son wished he had his paints so he could put a face on it.

The White Oak Trail leads through the "Cathedral," a grove of giant hemlocks between 300 and 400 years old. This dark and awesome forest is full of birds and flowers, and is appropriately called the "Limberlost" area.

(*Continued on page 23*)

TELL ME WARDEN . . . ?

By M. WHEELER KESTERSON *

JUST AS "Necessity is the mother of invention," it was necessity that drove the Virginia Commission to publish its law enforcement information pamphlet "Tell Me Warden." The Commission was directed by a long-felt public need for a publication which would answer some of the more basic game, fish, and dog law questions; a publication which would be read by those willing to read and learn.

In my fourteen years of warden service with the Virginia Commission, no publication has met this need of the public better than "Tell Me Warden." It was not bulky nor elaborate, but, rather, simple and to the point. It answered 12 basic, repeatedly asked, law enforcement questions. It gave names and addresses of all law enforcement personnel, and other members of the Commission. Some people learn more quickly from reading, others by being told. By having the laws written and a warden to explain them, if need be, it was simple for both segments of the people to learn, and therein was the basis for its publication . . . simply, clarity of the law.

Still the questions came. The same questions that were printed in 50,000 copies of "Tell Me Warden." In effect, the publication was an overwhelming success. In fact, it was so successful and created such a demand from sportsmen that the original publication fast became exhausted. But the original 50,000 copies only stirred the fire of the people's desire to learn. It would seem that for everyone who received a copy, two more wanted one. Therefore, another revised reprint is needed, and it will be had. But until then, it may be well to repeat some of the more often asked questions and answers here.

Perhaps, the question most frequently asked of the warden is, "Is everyone required to have a license to hunt, fish, or trap in Virginia?"

* Former chief of the law enforcement division, Commission of Game and Inland Fisheries, and now supervising warden of the Daniel Boone District.

Commission photo by Kesteloo

Each year Virginia game wardens answer thousands of questions on law enforcement and Commission activities

The law reads: "License shall not be required of landowners, their husbands or wives and their children, resident or nonresident, to hunt, trap, and fish within the boundaries of their own lands, and inland waters on said land.

"License shall not be required of bona fide tenants, renters or lessees to hunt, trap, or fish within the boundaries of the lands or waters of which they are tenant, renter or lessee and on which they reside; provided such tenant, renter or lessee has the written consent of the landlord upon his person, and provided further that a house guest of the owner of a private pond shall not be required to have a fishing license to fish in such pond.

"License shall not be required of resident persons under sixteen years old to trap or fish.

"License shall not be required to trap for rabbits with box traps."

Another question asked almost every day is, "Is the landowner's permission necessary before I can hunt, fish, or trap on his land?"

Of course permission from the landowner is necessary, and the law says in effect: Most lands in Virginia, except national forest and other state and governmental areas, are privately owned, and permission of the landowner must be had in writing if the land is posted; otherwise, oral permission is necessary prior to fishing, hunting or trapping thereon.

A tough part of the warden's job is dog-law enforcement. Whether through ignorance or negligence, a great many people fail to license their dogs at the proper time. For this reason the question, "What are the licensing require-

ments for dogs?" was included in this series of questions.

Dogs four months of age or over in the possession of any person, shall be immediately tagged. Dog license tags run for the calendar year; they are placed on sale by the treasurers of the cities, counties and towns on November 1 for the succeeding year. While these licenses are due January 1, a period of grace is allowed to January 31 for renewal, after which penalty will be enforced.

Questions come to the office of the Commission of Game and Inland Fisheries regularly, having to do with salt water fish and commercial fisheries. Commercial fishing does not come under the jurisdiction of the Commission of Game and Inland Fisheries, but is controlled by another state agency known as the Commission of Fisheries, with headquarters at Newport News.

Residents and nonresidents, alike, write to the Commission office for hunting, fishing, and trapping licenses; some just ask where they can obtain these licenses.

"Hunting, fishing, and trapping licenses and permits are obtainable from the offices of the clerks of the circuit courts of the counties, and the corporation courts of the cities, and from other authorized agents of the Commission of Game and Inland Fisheries." State forest permits are obtainable from Virginia Forest Service personnel.

Preceding every waterfowl season, questions concerning the fixing of waterfowl regulations come to the Commission.

"All regulations for the hunting of migratory waterfowl are fixed each year by the federal government. If and when the Commission adopts any or all federal regulations, same shall become state regulations. All information concerning migratory waterfowl hunting may be obtained by writing to the Fish and Wildlife Service, U. S. D. A., Washington 25, D. C., or to the Commission in Richmond."

Sometimes hunters, fishermen, and trappers are checked by the warden, and they have the proper license, but lack an additional stamp or permit necessary to participate in their respective sport on a particular area.

A number of additional stamps or permits are required in different localities of Virginia. They are as follows: "Stamp to hunt and fish on national forest lands. Stamp to hunt deer and bear. Deer damage stamp in certain counties. Federal migratory bird hunting stamp (obtainable at post office only). Permit to hunt or trap on state forest lands."

Persons taking up residence in the state of Virginia are quick to inquire, "Who is entitled to a resident license?"

The following persons are entitled to a resident license: a bona fide resident of the state who has resided in the county six months prior to the date of application for license; any person who is a member of the armed forces of the United States who is regularly located or stationed in the state; any bona fide student regularly enrolled in any preparatory school, college, or university located in the state who presents a certificate of enrollment; any person legally qualified to vote in the state. All other persons are required to have non-resident licenses.

A question which has caused some confusion is one having to do with the new three-day non-resident fishing license, which came into effect on July 1 of this year.

This special non-resident fishing license will be good only in one of the state's three interstate impoundments for the present time—South Holston Reservoir in Washington County.

In the other two interstate impoundments, Buggs Island Reservoir, between North Carolina and Virginia, and the Bluestone Reservoir, between West Virginia and Virginia, when a reciprocal agreement is entered into between Virginia and the respective adjoining states, upon the effective date the special non-resident three-day fishing licenses shall become valid therein.

Non-resident fishermen are cautioned that this new license is good only on Holston Reservoir for the present time.

All but the last of the nine preceding answers to the questions were repeated verbatim, in most cases, from "Tell Me Warden." They are repetitious, it's true, but when the same questions are being repeated day after day, the answers need repeating.

Your Commission of Game and Inland Fisheries has felt, for a long time, the need of an informed public. They knew that no greater asset to their game and fish program could be had than an enlightened public, for just as with laws, game and fish programs are only as strong as the people's acceptance of them. Without the people's understanding and acceptance of our game, fish, and dog laws, none of them would be effective, nor would we have a workable fish and game restoration program.

Thus, with the passing of the years, the inevitable change has been taking place in law enforcement activities. Where, at one time, the warden was strictly an apprehender of game hogs and violators, today he is an educator, and a public relations man as well.

"Tell Me Warden" keynoted this change. It was a major step toward wiping out "ignorance of the law"—the reason for a high percentage of our violations. It was a step toward informing the people and making every citizen know right from wrong, legal from illegal.

There always will be game law violations, and there always will be some that "get away with it." But inform the good citizen—the honest sportsman, as to the exact meaning of the law; teach him right from wrong, and he too will recognize a game hog and game law violator as quickly as the warden, and he will look with wrath upon them. When that day comes the job of the warden will be lessened considerably, for no greater punishment can be meted out to any law violator than public scorn.

FUN ON A BIRD WALK

(*Continued from page 20*)

The red spruce, with its short, sharp, four-sided needles grows here and is one of the rarest trees in the park. Other than in the "Limberlost" area, Stony Man and Hawksbill mountains are the only places in the Shenandoah Park where this tree is found.

A rare evergreen shrub is the Canada yew, which produces red berries instead of cones. In the park it is found in only two places, on Stony Man and on the White Oak Trail.

Some in the party wanted to go down to a scenic waterfall. Mr. J. R. Sydnor of Richmond, his daughters, and Bruce McCartney kept on the trail which leads to the falls and Mr. Favour led the rest of us along an old mountain road through what had once been an orchard. Wild crab apple trees were in full blossom. Goldfinches, indigo buntings, juncos, the Maryland yellow-throat, with his "witchery, witchery," were easily seen. Bird's-foot violets with their yellow centers and mountain pinks and anemones grew abundantly. Chats and field sparrows were undisturbed by our presence.

Mr. Favour pointed out some deer tracks and showed us the dusting places of the ruffed grouse. There are bobcats too in the Shenandoah, so we were informed. On the top of a dead apple tree a hummingbird sat as if intent on spending the rest of the day there. Naturalist Favour said that the hummingbirds nest regularly in this tree.

As we approached the end of our walk and the highway came into sight, we sat down beside the path and counted the birds we'd seen on the walks. Some forty were named and marked on the check list.

Soon after we reached the cars, Mr. Sydnor, the girls, and Bruce McCartney joined us. They were full of excitement, having seen a hooded warbler and a spotted sandpiper down at the falls. The sandpiper had not been recorded before for this area. So they added a new bird to the park's list of about 200 species.

There was to be another walk in the afternoon, but we had to get back to Charlottesville and so we said good-bye to our friends.

Yes, a bird walk can be fun. In the company of an interested group of people, it is not only a sociable get-together, but also a rich ornithological experience.

THE MANAGEMENT OF VIRGINIA'S SEAFOOD RESOURCES

(*Continued from page 12*)

Does the Present Program Hold Promise for the Future?

Virginia has recognized the need for management by providing a Commission of Fisheries to enforce the laws, and a Fisheries Laboratory to conduct scientific investigations. This program has cost the state relatively little: in the fiscal year 1950-51 the operation of the Commission and the Laboratory cost only about two per cent of the total landed value of seafoods in the state, and a much smaller proportion of the total income of the industry. The work of the Laboratory in establishing a firm scientific basis for the management of Virginia's seafood resources has just begun.

Rule-of-thumb management of the fisheries is not efficient management. The penalties are wasted time, effort, and expense, a false feeling of security, and sometimes actual interference with the fisherman's source of income. We do not know at present which of our laws are good and which are useless; we lack much of the knowledge that is necessary for intelligent management. Much patient investigation will be required before the basic principles are established.

SMALLMOUTHS FROM THE BIG JAMES

(*Continued from page 9*)

seventh rush upstream and jumping easily a dozen times, the great lunker eased up the struggle. I scooped him up onto a rock with both hands and pounced on him. Chuck nearly fell into the water from exhaustion.

With fishermen's eyes we both measured the whopper—a six-pounder easily. A grandaddy smallmouth and hard as the rock we were standing on!

It took a while for us to get back to reality. Seven pounds of dynamite is not something you get over right away. The water rose around our toes and reminded us it was time to go.

Slowly we gathered ourselves together, Chuck dragging the big fish, and edged into the swift water looking toward shore. Chuck broke the spell finally: "After this . . . we should be able to take anything this James can throw at us. What say?"

"Yeah," I came back, "even though it looks like we're going to have to swim our way all the way down to Richmond. Let's go!"

FOUR $1,000 SCHOLARSHIPS IN CONSERVATION TRAINING ANNOUNCED

The National Wildlife Federation has announced four grants of $1,000 each for college fellowships in advanced conservation training or research. Designated as "J. N. (Ding) Darling Fellowships" in honor of the famous newspaper cartoonist and conservation leader who organized the Wildlife Federation in 1936, the 1952 grants went to the following institutions:

Long Beach State College of California—For research expected to come up with a practical program of conservation education for city school children.

Cornell University—Research into and demonstration of tape recordings as a medium of conservation education.

Boston University—Graduate study of the organization and aims of conservation education.

University of Wyoming—Development of instructional units for teaching conservation in high schools.

MONTGOMERY IWLA CHAPTERS CO-OPERATE WITH SCS

Waltonians Averett and Littleton of the Christiansburg-Montgomery Chapter of the Izaak Walton League of America last May prepared an article on Waltonian participation in the Soil Conservation District program which has been widely printed. Little River, potentially a fine bass stream, has in the past been muddy about 360 days of the year. When about 80 farmers in the Little River watershed put their farms under the Soil Conservation District program, the river showed much improvement. The Christiansburg, Radford, and Blacksburg chapters have secured good co-operation from the State Highway Department, which is protecting the river from excessive siltation from highways.

COMMISSION SELLS WINDSOR SHADES GAME FARM

By authority of the 1952 General Assembly the Commission of Game and Inland Fisheries last July sold to the Department of Conservation and Development the old Windsor Shades game farm on Highway 60 in New Kent County, consideration being $30,650.

The Commission purchased the area in the early twenties for the purpose of establishing a quail farm which was one of the first quail propagation plants in the United States. When the federal government impounded the waters of the Chickahominy River in 1942, a part of the tract acquired by the Commission was inundated. The increased humidity caused by the formation of Chickahominy Reservoir made it impossible for the Commission to continue the propagation of quail on the area. It became necessary, therefore, for the Commission to transfer its quail propagation activities to Cumberland County.

Claims have been filed with the federal government for damages, due to the inundation of some of the lands and the destruction of timber on part of the tract. The Commission in 1946 sold more than $30,000 worth of timber off the tract so that as a whole the tract has proved a good investment, though the re-establishment of the game farm in another area was at considerable cost to the Commission.

Slight differences of thought

The Division of Forests of the Department of Conservation and Development will utilize the Windsor Shades area for a tree nursery to produce tree stock for distribution in the state.

PUBLIC FISHPOND TO BE CONSTRUCTED IN HALIFAX COUNTY

The Commission of Game and Inland Fisheries, at its July meeting, directed its executive director, I. T. Quinn, to contact interested parties in Halifax County so that sufficient land can be obtained and deeded to the Commission for the construction of a public fishpond.

This matter has been delayed for more than two years due to conditions over which the Commission had no control. It is expected that land will be acquired and deeded to the Commission and that the pond will be constructed in time to receive fish brood stock in the early part of 1953.

$10,000 OFFERED FOR HUMANE TRAP

An offer of a $10,000 reward for a humane trap that will be acceptable to commercial trappers as a substitute for existing steel-jaw traps has been announced on behalf of the American Humane Association by Mel L. Morse, the Association's executive director.

The American Humane Association is the national federation of more than 600 local and regional humane societies in the United States and Canada. Its headquarters is in Albany, N. Y.

Morse said that the only stipulation about design or construction of the trap sought is that it must hold a trapped animal without harm or kill it instantly and that the trap must be commercially acceptable as a substitute for traps now commonly used.

"The American Humane Association has only a humane interest in making this offer," Morse said. "Patent rights will remain the property of the inventor. We are offering the $10,000 reward merely as an incentive to inventive thinking. We hope that we can help, with this reward, to develop a trap that will minimize the suffering which is an unavoidable result of trapping."

Details of the reward offer can be obtained by writing to Lester A. Giles, Jr., director of Wildlife Department, American Humane Association, 135 Washington Avenue, Albany, N. Y.

Field Force Notes

COMMISSION HIRES FIRST ASSOCIATE GAME TECHNICIAN

The Virginia Game Commission added a new member to its staff of technically trained game men during the summer. He is Julian C. Harvey, Jr., of Lynchburg, who became the first associate game technician on the Commission staff.

Harvey has assumed his duties in the Piedmont District, and will work

Julian C. Harvey, Jr.

primarily on the Commission's farm game program. Although largely concerned with the farm game program, Harvey also will continue work on quail population studies, which he had begun during his stay at V. P. I. He will serve directly under C. H. Shaffer, game technician and farm game project leader for the Commission.

Harvey is a graduate of Lynchburg College and has completed his course work for his master's degree in wildlife management at V. P. I. He served for three years with the U. S. Air Corps during the last world war.

QUAIL OUTLOOK GOOD, TURKEY FAIR FOR COMING SEASON

Reports from various sections of the state indicate that if conditions continue good for the remainder of the summer and fall, Virginia will enter the next hunting season with a fine crop of quail and a fair crop of turkeys.

I. T. Quinn, executive director of the Commission, reports that there was a good carry-over of brood stock of both species from last season and barring too many hazards, which often affect these birds, the coming season for these and other species of game should be highly satisfactory to the hunter.

TROUT RESTOCKING AREAS CLOSED IN JEFFERSON NATIONAL FOREST

Fishing and trespassing have been prohibited since early summer within closed trout restocking areas established on Barbours Creek, in the Jefferson National Forest. The three closed areas are two-tenths of a mile in length and are spaced one mile apart on the stream.

On June 2, 1952, 500 trout (mostly rainbow) were released in each of the enclosures. Since the release, fisherman-use has been steady with an average of about two men on the stream per day. Formerly, fish released in open waters were followed by a mad rush of anglers. This confusion usually continued for about three days during which time the majority of the fish were taken.

On June 16, 1952, the stream was checked by game technician Dick Cross, of Roanoke, and C. W. Surber, warden for Craig County. Approximately 50 trout were counted in a one-quarter mile stretch of open water. Seventeen fish were counted in one pool inside a closed area on the same day. On June 30, 1952, 11 trout were observed in two pools in open fishing water.

Direct observations and conversations with fishermen on the stream indicate that this method of stocking trout is desirable. The fish gradually emigrate from the stocking areas, thus making available to the sportsman reasonably good fishing over a considerably longer period.

RICHMOND SPORTS ANNOUNCER VISITS BACK BAY INSTALLATIONS

Jack Lewis, sports commentator for Richmond radio stations WMBG and WTVR, recently visited the Back Bay area to make on-the-spot tape recordings of fishermen and game warden activities for his radio and television programs.

Lewis was flown over the territory covered by game wardens working out of Back Bay warden headquarters by

Commission photo by Kesteloo

Jack Lewis, sports commentator for Richmond stations, WMBG and WTVR, shown entering the Commission's patrol plane with Jack Fentress, game warden for Princess Anne County. Fentress flew Lewis over the Back Bay area

Jack Fentress, flying warden of Princess Anne County. During his stay, Lewis made tape recordings of actual plane and boat patrols, including the transmitting of messages from patrol plane to the patrol boat and then to headquarters.

Wildlife Questions and Answers

Ques.: Are porcupines found in Virginia today?

Ans.: At present the porcupine is not known to inhabit Virginia, but in colonial times it was often taken in the Commonwealth. There are records of two porcupines killed in Gloucester County in 1739. Several unconfirmed rumors tell of porcupines having been taken "in Virginia." The porcupine is included in some lists of Virginia mammals.

Ques.: Where can I obtain conservation material for use in classroom teaching?

Ans.: Such sources are numerous. In Virginia material may be obtained from the following: Virginia Forest Service, Box 1368, Charlottesville; V. P. I. Extension Service, Blacksburg; State Water Control Board, Richmond; Commission of Fisheries, Gloucester Point; U. S. Forest Service, Harrisonburg; Department of Conservation and Development, Life Insurance Company of Virginia Building, Richmond; U. S. Department of Interior, National Park Service, 900 North Lombardy, Richmond; and Commission of Game and Inland Fisheries, 7 North Second Street, Richmond.

Ques.: Is the starling a native North American bird?

Ans.: No. It was introduced into New York from Europe in 1890.

Ques.: Is "snowshoe rabbit" another name for the varying hare or are they two distinct species?

Ans.: "Snowshoe rabbit" is another name for the varying hare and is derived from a physical characteristic. This name comes from the fact that in winter a heavy coat of hair covers their large hind feet and spreading toes, which forms padlike "snowshoes" enabling them to move freely over soft snow.

Ques.: What is a pipistrelle?

Ans.: The pipistrelle is a cave bat, one of three species of bats most commonly found in the caves of southwest Virginia. It is a very small bat, about 3 to 3½ inches in length, and is easily distinguished by its yellowish-brown color and almost naked muzzle.

Ques.: I have heard it said that only the female mosquito bites. Is this true?

Ans.: Yes. Only the female mosquito is capable of biting humans. The male feeds on plant juices.

Ques.: What is the difference in the snowy egret and the American egret?

Ans.: The distinguishing feature between these two beautiful birds, which can be told at a glance, is the yellow legs of the snowy egret, whereas, the American egret's legs are dark gray.

Ques.: When is the fisher believed to have disappeared from Virginia?

Ans.: The fisher may have occurred in Highland County until the 1890's but there is no authentic record for that area. The only definite record of its occurrence is that of Audubon and Bachman who observed one in Giles County in July, 1839. It was probably never common in Virginia, as Virginia was near the southern fringe of its range.

Ques.: Do deer change the color of their coats?

Ans.: Yes. They have a short, reddish summer coat and a dark gray heavy winter coat.

Ques.: Do cottontail rabbits dig their own dens or use those dug by other animals?

Ans.: Both. Cottontail rabbits are not true burrowing animals and do not hesitate to use holes made by other animals. When there is an abundance of natural cover they make forms in which they conceal themselves. At other times when the vegetation is not dense

"Suppose you just try this one on for shape"

they dig holes, or use those deserted by other animals, as well as hollow logs and natural cavities.

Ques.: What poisonous snakes are found in Virginia and how many fatalities from snake bite were there in the state last year?

Ans.: Virginia has three recognized species of poisonous snakes: timber rattlesnake, of the uplands; the copperhead, sometimes called the highland moccasin; and the cottonmouth moccasin, found along the tidewater inland reaches and brackish and fresh waters. During 1951 not one person died from snake bite in Virginia.

Ques.: Is it true that a bobcat will eat only those animals which he himself kills?

Ans.: No. The bobcat is essentially a hunter and prefers to catch his own prey, although he is not averse to eating dead animals killed by others.

Ques.: Can a fox climb a tree?

Ans.: Red foxes, no. Gray foxes, yes. They climb low trees almost as readily as cats.

Ques.: What mammals, besides bats, can fly? What about flying squirrels?

Ans.: The bat is the only flying mammal. As for flying squirrels, they have skin folds which, when their legs are extended, enable them to glide from a high point to a lower point.

Ques.: What is the most common duck found in Virginia's coastal waters?

Ans.: The black duck is most frequently seen in Virginia.

Ques.: Are mushrooms plants?

Ans.: Yes, but they are of a peculiar nature in that they lack the green particles (chlorophyll grains) found in the leaves of trees, shrubs, herbs and grasses.

Ques.: What is the present status of the whooping crane in the United States?

Ans.: This is one of our disappearing birds. Although agents of the National Audubon Society and the U. S. Fish and Wildlife Service have combed Arctic Canada in vain for their unknown nesting ground, the surviving cranes return each year to their winter home on the Texas coast. Thirty-three were counted in 1948, 36 in 1949, 32 in 1950. It's touch and go for these aristocratic white waders.

Ques.: What is the outlook for the grouse population this year?

Ans.: Reports coming from field men, from forest rangers, and wildlife workers in the national forests indicate a very good grouse population in Virginia again this year.

Ques.: Are snakes "deaf as an adder?"

Ans.: They are. Snakes have no ears but "hear" by feeling vibrations in the ground. As for as snake charmers are concerned, they "charm" their subject by the rhythmic swaying of their bodies and the movement of the flutes.

Ques.: Are grindle, or bowfins, good to eat?

Ans.: Yes. According to the latest releases from the U. S. Fish and Wildlife Service, grindle are not only good to eat but make very excellent morsels if smoked.

Ques.: What is a takahe?

Ans.: The takahe is a plump bird, about 18 inches in height, which has no power of flight. Apparently it had no enemies from which it needed to fly until the Maori settled in New Zealand. They found the flesh pleasing and killed so many of these birds that when white settlers arrived the birds were scarce. An expedition was organized, and two takahes were sighted and captured. After measuring and photographing, they were released to reproduce their own kind.

Ques.: What are some of the maximum flying speeds for representative bird groups?

Ans.: Most of the common small birds, about 40 or 50 m.p.h. Swifts, however, can achieve 170 m.p.h. Doves and pigeons, 65 m.p.h. Wild geese and ducks, 70 m.p.h. The fastest of the hawks, the duck hawk, 170 and 200 m.p.h.

BOY SCOUT CAMPOREE AT WHITE TOP MOUNTAIN

In his role as public relations man, the Virginia game warden plays a big part in youth training. Included here are some of the highlights of a Boy Scouts camporee, held at Feather Camp on Laurel Creek, in the White Top district during the summer. Two Commission law enforcement officers, E. S. Yeatts and Dave O'Neil, were on hand to give the boys a few pointers on law enforcement and conservation.

Commission photos by Kesteloo

Somewhere among these rolling mountains is Feather Camp, a Boy Scout camp for the White Top Mountain district in southwest Virginia. The picture was taken from top of White Top Mountain

Laurel Creek, running through the district, provided trout for the boys who liked to fish. Leroy Sanders (left) compares his catch with that of Donald Price; both are from Saltville

Warden E. S. Yeatts (left end) of Washington County, and conservation officer Dave O'Neil (center) from Norton, familiarize the boys with the "Walkie Talkie" and some of the other warden equipment

A typical scene of outdoor living is depicted by these Boy Scouts at chow time. Such scenes are found throughout the Commonwealth, where youngsters learn to live and work together in the out-of-doors

Warden Yeatts explains the big role that each scout and every other outdoor youngster must play in the movement to conserve our woods, waters, soils, and wildlife for future generations

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